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THE DETERNUNATION OF HALF-LIVES FOR NUCLEAR LEVELS BY SELF-ABSORPTION NUCLEAR RESONANCE FLUORESCENCE EXPERIMENT

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The self-absorption method is very effective technique for determination of nuclear half-times in energy field below nuclear threshold. This method based on effect of the decreasing of photons number in incident beam after absorption by the absorber of the same material as the scatterer. The main advantage of the self-absorption experiment over the scattering experiment is its ability to yield the width with very little information concerning the incident spectrum.

Self-absorption experiment have been performed for the 3.449 MeV level of the Fe-56 nucleus using brermsstrahlung with an endpoint energy 6.6 MeV from the continuous-wave electron beam of a Moscow race- track microtron injector. There was sufficient difference between data by this value from different experiments. So, ENSDF shows for this level t=5-11 fs. For example, in gamma-scattering experiment had shown value 113 fs. In self-absorption experiment on Moscow CW RTM injector value t=3.33-3.97 fs has been obtained. This value shows the good agreement with previous results from (g,g')-scattering, have been performed on this accelerator]. In these experiments value t=3.18-3.82 fs has been obtained. Also the value for branching of this level (0.75-0.79) has been determined in scattering experiments.

SHELL STRUCTURE OF THE GIANT DIPOLE RESONANCE IN THE NUCLEI WITH A = 30-60

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Investigation of partial photonucleon channels of the decay of the giant dipole resonance (GDR) with the population of individual levels i of a product nucleus A-1 provides valuable information about the configuration structure of the dipole states and about the mechanism of relaxation of the GDR.

New data on partial channels of photoneutron (g,n-i) and photoproton (g,p-i) reactions for the 35,37-CI, 45-Sc and 58-Ni nuclei from (g,xg') experiments (g - gamma quantum, x - proton, neutron, deutron etc., g'- de-excitation photon) make it possible to obtain deeper insight into the mechanism responsible for the formation and decay of the GDR in the nuclei with A=30-60.

The data on the proton partial channels for 58-Ni indicate the configurational splitting of the GDR in the light lf2p-shell nuclei. Centers of gravity for El transitions from outer shell (lf2p⇒lg2d3s) and inner shell (ld2s⇒lf2p) are split in energy. This is the first evidence of this phenomenon for such massive nuclei.

From analysis of all data on partial photonucleon reactions (g,p-i) and (g,n-i) we have received the relative contribution of the nucleon El-transitions ld2s⇒lf2p, and lf2p⇒ lg2d3s to the formation of the GDR in the nuclei with A=30-60. It can be seen from the data that the ld2s⇒ lf2p transitions probability increases with A, as a consequence of the filling of the ld2s-shell. Beginning with the Cl isotopes the